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The urban development of European border regions: a spatial typology

CHRISTOPHE SOHN, NORA STAMBOLIC

Abstract

Border regions have long been considered as economically disadvantaged areas that are not conducive to urban development. The European Union enlargement and integration processes and the subsequent relative opening of borders have had a profound impact on border regions, resulting in new patterns of urban development. The objective of this paper is to provide empirical evidence for effects of urbanisation in all European border regions. Based on a functional approach that delineates border regions according to their propensity to be influenced by the relative proximity to a border, the resulting typology brings to the fore eight categories of urban border regions and highlights their geographical pattern at the European scale. The use of demographic data allows for better assessment of the importance of the urban development of border regions, including their cross-border dimension, and to underline national specificities.

Border regions, urban potential, metropolitan areas, spatial typology, Europe

Zusammenfassung

Die urbane Entwicklung europäischer Grenzregionen: eine räumliche Typologie

Grenzregionen gelten seit Langem als wirtschaftlich benachteiligte Gebiete betrachtet, deren urbane Entwicklung zudem beeinträchtigt ist. Die Erweiterungs- und Integrationsprozesse der Europäischen Union und die relative Öffnung der Grenzen in Folge, haben sich maßgeblich auf die Grenzregionen ausgewirkt, wodurch neue Muster der urbanen Entwicklung entstanden sind. Mit dieser Studie sollen empirische Nachweise für die Auswirkungen der Urbanisierung in allen europäischen Grenzregionen vorgelegt werden. In einem funktionellen Ansatz werden die Grenzregionen danach eingestuft, wie stark die jeweilige Tendenz zur Beeinflussung durch die relative Nähe zu einer Grenze ist. Die daraus resultierende Typologie weist acht Kategorien urbaner Grenzregionen auf und beleuchtet ihr geografisches Muster auf europäischer Ebene. Demografische Daten werden herangezogen, um die Bedeutung der urbanen Entwicklung von Grenzregionen einschließlich ihrer grenzübergreifenden Dimension besser beurteilen und nationale Ausprägungen hervorheben zu können.

Grenzregionen, urbanes Potenzial, Stadtgebiete, räumliche Typologie, Europa

Introduction

The acceleration of the globalisation of economic and cultural exchanges, the demise of the Iron Curtain and the enlargement as well as consolidation of the mechanisms of European integration have resulted in an increased permeability of state borders within the EU. From being barriers to flows, hampering social and economic development, borders have become interfaces favouring contacts and exchanges (ANDERSON 1996; O'DOWD 2002). This process of 'debordering' has notably resulted in an increase in the cross-border flows of workers, goods and information, leading to the social and economic development of certain border regions and the formation of functional urban areas that span across borders. Whereas the emergence of the so-called cross-border metropolitan regions has attracted the attention of scholars (DECOVILLE et al. 2013; REITEL 2006; SOHN et al. 2009; SOHN 2014; VANDERMOTTEN 2007) and institutional organisations (BMVBS 2011; ESPON 2007 & 2010, OECD 2013), the systematic and quantitative analysis of urban development within border regions has so far hardly been tackled. This shortcoming results in a lack of data and a certain ignorance about the demographic evolution and spatial development of border regions across Europe.

Based on this observation, the aim of this article is to assess the urban development potential of European¹ border regions and highlight the formation of cross-border urban entities. Three research questions are investigated: What is a border region and how can we assess its urban development? What is the importance of the phenomenon in terms of demographic structure and dynamics? Where and according to what geographical pattern does the urbanisation of border regions take place? By addressing these questions from a functional perspective based on accessibility measures, we aim to avoid the territorial delineation of border regions from a national

viewpoint as this might lead to a lack of comparable data at the European level and therefore inconsistencies in the analyses. In this study, border regions are defined as places whose social and economic development is likely to be influenced by the relative nearness to a border, whereas their urban potential is assessed according to their metropolitan functions. The cross-border dimension of urbanisation is evaluated via the cartographic interpretation of the typology.

The paper proceeds along the following lines. The first section explores the theoretical relationship between border regions and cities and underlines the empirical challenge to the analysis of urban dynamics in these areas. The second section critically examines the existing delineations of border regions and presents the approach followed for elaborating the spatial typology of urban border regions. In section three empirical evidence of the urbanisation of border regions is presented to reveal population distribution and urbanisation dynamics. Based on the mapping of the typology, the spatial patterns of functional urban border regions and their cross-border dimension are presented in section four. Section five offers the conclusion.

Urban development and borders

The urbanisation of border regions is not a straightforward research question; instead it has long remained a marginal issue in academia in general and in geography in particular. The first section describes this uneasy theoretical relationship between cities and political boundaries and underlines new theoretical perspectives that have arisen from a renewed vision of borders. The empirical challenge that results from the analysis of the urbanisation of the border regions is then considered from the point of view of the production of geographic data.

Uneasy theoretical relationships

As a component of the nation state, borders have long evoked the idea of periphery or outermost extremity, of closure and emptiness, while the cities have al-

ways been associated with the idea of centrality (economic, political and cultural), of accumulation and connectedness (REITEL et al. 2002). The classical approach to borders taken by regional studies and economic geography is emblematic of this vision, with borders seen as barriers to international trade generating distortions in markets and border regions considered as economically disadvantaged areas that are not conducive to urban development (see in particular CHRISTALLER 1933 and LÖSCH 1940). This situation is associated above all with the desire of states not to develop economic and social systems at the margins of their territory that are difficult to control and likely to generate covetousness (SAEZ et al. 1997). To this can be added the military imperatives that confer on borderlands the status of military buffer zones (FOUCHER 1991). These conditions, which accompanied the formation of modern states from the 16th century onwards, explain why the major cities and, *a fortiori*, the capital cities, are only rarely located close to an international border. While borderlands are generally not highly urbanised, two exceptions should be noted. First, there are cases where the relocation of a border close to a pre-existing city has cut off the latter from part of its hinterland. Copenhagen, Berlin and Vienna are European capital cities that have faced the legacy of such historical border shifts. If the imposition of a border has precipitated cities nearby into a more peripheral situation, hampering their urban development, some of them have been able to benefit, legally or illicitly, from cross-border differentials and other advantages they have been able to extract in order to develop and become relatively important urban centres. In this regard, the case of Basel appears emblematic, as Swiss entrepreneurs were able to establish branches in Germany in order to avoid customs duties and benefit from lower wages (see HANSEN 1981). Second, there are border towns that have been created from scratch. Numerous fortified locations have thus been built in order to strengthen the defensive function of a

¹ In this paper, 'Europe' refers to the so-called 'ESPON space', which covers the entire European Union plus Switzerland, Norway, Iceland and Liechtenstein.

border and proclaim the power of a sovereign state (DENYS 2002). In some cases – although these are rare – the creation of a border town following the imposition of a new border was undertaken for economic or administrative reasons and not strictly military ones (such as Haparanda on the Sweden-Finland border). As territorial gateways, these places have developed border-related activities such as transit, storage and clearance of goods. Finally, whatever their origin, all border cities remain places that are not only located close to a border but are also dependent on the border for their very existence (BUURSINK 2001).

Following the relativisation of the role of the state in economic and social regulation as well as the exercise of political power (JESSOP 2004), new perspectives have arisen regarding the relationship between city and border. The development of functional urban systems, though discontinuous, is no longer limited by national borders but rather increasingly concerns cross-border areas. This urbanisation of border regions is reflected in a concentration of capital, industries and tertiary activities and is accompanied by an increase in cross-border flows of workers, goods and information. The blossoming of this socio-economic and cultural interaction involves an effect linked to the opening up of borders that have changed from 'barrier' to 'interface' or 'junction' (STRASSOLDO 1970; O'DOWD 2002). Leaning on an empirical analysis of the border dynamics at the heart of the upper Rhine, HANSEN (1977, p. 12) suggested that "In view of these considerations, it may be hypothesized that a stable border, together with relatively unimpeded international labour and capital mobility will, on balance, be more advantageous than disadvantageous to a border region". Examining the changing role of international borders in the development and planning of U.S.-Mexico border cities, HERZOG (2000, p. 139) confirmed the changing significance of borders insofar as they "now offer enormous new opportunities for resource development,

production and urban growth". The porosity of state borders constitutes an opportunity for nearby cities to take advantage of cross-border differentials (in particular in relation to tax regimes, regulations or labour costs) and to exploit the positive benefits that these represent for firms and workers.

Several theoretical perspectives have been elaborated in order to take into consideration the opportunities an open border may represent for cities and regions. As an exhaustive review goes beyond the scope of this paper, we focus on three relevant contributions. The 'regional active space' approach promoted in regional science puts emphasis on regional development as a creative learning process related to an institutional setting and underlines the importance of the entrepreneurial and territorially strategic behaviour of a region's actors (VAN GEENHUIZEN & RATTI 2001). Applied to border regions, such a paradigm has shown how regional actors can take advantage of the openness of political borders. Based on the analysis of changing border functions and the way they can be mobilised by actors as resources, SOHN (2014) has developed a conceptual framework that highlights the different ways open borders offer opportunities to cross-border metropolises for reinforcing their place in global economic networks, thus enhancing their autonomy as cross-border regional entities. Finally, the extent to which a cross-border context might be favourable to innovation-driven economic development as well as the potential driving forces that might be grasped and fostered has been examined in a recent report from the OECD (2013). Most of the research investigating the driving forces as well as the consequences of the urbanisation of border regions has been based on case studies and small comparative analyses (see notably SOHN et al. 2009). These in-depth analyses of the mechanisms and strategies at play do not aim to provide an exhaustive assessment of urban development in border regions. To our knowledge, BRAKMAN et al. (2012) conducted the only study that investi-

gates in a systematic way the effect of EU integration on population growth of border cities. Their results show that despite a negative general border effect, EU enlargement has a positive empirical effect as measured by the growth in share of population along the integration borders. That said, the use of a restricted definition of urban space (cities defined at municipal level) neglects other urbanisation dynamics such as peri-urbanisation or metropolisation and therefore does not allow one to grasp the geography of urbanising border regions.

The empirical challenge

There are a few studies that have considered the urbanisation of European border regions from a statistical as well as geographic perspective. The analysis of Functional Urban Areas (FUAs) conducted within the framework of the ESPON programme is, to our knowledge, the first in that respect. These urban areas are based on the analysis of commuting patterns around morphological urban cores (PEETERS 2011). Based on an inventory of FUAs in Europe (EU plus Switzerland and Norway), the project Study on Urban Functions (ESPON 2007) allowed the identification of 28 cross-border urban configurations, among which 15 metropolitan areas with a total of 32.6 million inhabitants and 13 medium and small cities of all together 2.2 million inhabitants. This list was re-examined within the Metroborder project (ESPON 2010) with a specific focus on cross-border metropolitan areas, that is, urban formations inserted into global economic networks and whose region-based functional space transcends international borders. The most relevant examples of this type include the regions of Aachen-Liège-Maastricht, Basel, Copenhagen-Malmö, Geneva, Luxembourg, Lille, Saarbrücken, Strasbourg and Vienna-Bratislava (see Tab. 1). One of the major drawbacks in this study is the inconsistency of cross-border labour market interaction data (PEETERS 2011). The geography of the border FUAs is therefore biased due to the persistence of a state-centrism in the

statistics. Non-metropolitan urban border areas also tend to be neglected.

The study of metropolitan areas in Europe conducted by the German Institute for Building, City and Spatial Research (BBSR 2010) provides another perspective on the urban development potential of border regions although it does not specifically focus on the border context. The analysis is based on the definition of metropolitan functions of 38 statistical indicators grouped into five key areas (i.e. politics, economy, science, transportation, culture). Places with a high density of metropolitan functions are then identified for the entire European continent. Finally, the use of an accessibility model allows one to define the metropolitan areas that surround places of concentration of metropolitan functions based on a travel time of 60 minutes by car. In this case, the shortcomings due to the limited availability of data are overcome by the use of a potential measure of spatial interactions for defining the metropolitan areas in question. Out of the 125 metropolitan areas identified on the European continent, 36 cases reach or cross international borders to varying extents. The cases that display the most significant cross-border dimension (at least 10 % of the surface of the metropolitan area) show a strong convergence with the ESPON results (Tab. 1). The spatial scope of the study is nevertheless restricted due to its deliberate focus on metropolitan areas. Small and medium-sized border cities as well as rural areas are not considered.

Concepts and method

To assess the urban development of European border regions requires conceptual clarification as well as methodological specifications. Firstly, we critically examine the existing definitions of border regions and present the functional approach mobilised in order to delineate them. Secondly, we introduce the method and data used to assess their urban potential. Lastly, we describe the classification procedure followed in order to produce the typology of urban functional border regions.

Cross-border metropolitan regions identified in ESPON and BBSR studies

Entities	ESPON		BBSR	
	Cross-border dimension [% of population]	Population [million]	Cross-border dimension [% of surface]	Population [million]
Aachen-Liège-Maastricht (B-D-NL)	49.7	3.1	33.87	3.5
Arnhem-Nijmegen (NL-D)	11.7	1.2	–	–
Basel (CH-D-F)	52.0	1.0	80.90	2.4
Bruxelles/Brussel (B-NL)	–	–	18.78	6.7
Eindhoven (NL-B)	–	–	15.78	2.6
Genève (CH-F)	31.4	0.7	91.68	1.3
Gent (B-NL)	–	–	17.70	2.1
Graz (A-SLO)	–	–	11.24	1.2
Groningen (NL-D)	–	–	11.42	1.7
Innsbruck (A-D)	–	–	30.40	0.6
Katowice-Ostrava (PL-CZ)	18.6	5.3	–	–
København-Malmö (DK-S)	33.8	2.8	54.74	2.9
Lausanne (CH-F)	–	–	13.06	0.8
Lille (F-B)	16.8	3.1	23.66	3.6
Luxembourg (L-F-D-B)	61.8	1.0	77.50	1.8
Nice (F-I-MC)	9.0	1.2	15.16	1.4
Saarbrücken (D-F)	13.0	1.1	–	–
Salzburg (A-D)	–	–	31.83	1.0
Skopje (MK-RKS)	–	–	21.56	1.4
Strasbourg (F-D)	24.8	0.8	25.99	1.6
Twente-Nordhorn (NL-D)	23.6	0.6	–	–
Vilnius (LT-BY)	–	–	18.29	0.9
Wien-Bratislava (A-SK-H)	23.3	3.4	39.68	4.1
Zagreb (HR-SLO)	–	–	15.81	1.5

Source: BBSR 2010, ESPON 2010, own calculation

Tab. 1: Cross-border metropolitan regions identified in ESPON and BBSR studies

Delineation of border regions

In Europe, the definition of EU border regions is based on an administrative approach, namely the Nomenclature of Territorial Units for Statistics (NUTS). Relying on this system, NUTS 3 level regions that are adjacent to a state border are considered as border regions. For maritime borders, a maximum distance of 150 km to the nearest shore is considered for these units to be included. The NUTS 3-based selection of border regions refers to the regions participating in three areas of cross-border cooperation programmes: the European Regional Development Fund (INTERREG), the Instru-

ment for Pre-Accession Assistance (IPA) and the European Neighbourhood and Partnership Instrument (ENPI) (DIJKSTRA & POELMAN 2011). The NUTS nomenclature defines the relevant territorial units according to population thresholds (between 150,000 and 800,000 inhabitants for NUTS 3). Due to uneven population distribution and national territorial specificities, the defined NUTS administrative regions differ sharply in terms of surface. For instance, the NUTS 3 of Aachen (a district in the west of North Rhine-Westphalia, Germany) has a population of 542,833 inhabitants covering a surface of 707.15 sq.km, whereas the NUTS 3 of

Ostfold (a county in south-eastern Norway) has 282,000 inhabitants covering a surface of 4,180.69 sq.km. Therefore, these spatially heterogeneous administrative border regions are considered inadequate for performing a comparative analysis of border regions at EU level.

Another example of defining border regions can be found in North America. The border region between the United States and Mexico is formally defined as the area of land stretching 100 km north and south of the international boundary, according to the 1983 La Paz Agreement. This twice 100 km 'buffer zone' was established by the governments of Mexico and the United States and includes 48 U.S. counties in 4 states and 94 Mexican municipalities in 6 states, including 15 pairs of sister cities. Such an approach based on Euclidian distance is founded on the principle of distance decay: the more one is spatially distant from the border, the less one resents its effects. However, it does not take into consideration the functional accessibility as shaped by transport infrastructure, border-crossing points and mobility patterns and therefore assumes a homogeneous border influence across space.

For this study, we favour a functional approach based on accessibility: what really matters is not the spatial proximity of a given area to a border nor its contiguity but the time needed for effectively reaching a border-crossing point. As such, we consider border regions as places whose social and economic development is potentially influenced by the relative proximity of a border. Based on travel distance by car, two categories of border regions are distinguished. The first, called *core border regions*, are composed of Local administrative level 1 or 2 units (LAU-1 and LAU-2 units)² located less than 45 minutes away from the closest border. This travel distance is consid-

ered as encompassing the area of high influence of a border. The second called *adjacent border regions* are composed of LAU units located between 45 and 90 minutes away from the closest border. This travel distance is considered as reflecting the area of lesser influence of a border.

Definition of the urban potential

The definition of the urban dimension of a given area can be handled according to different approaches: institutional with the use of administrative definitions, morphological with density measures and functional based on home-work commuting data. In this study we favour another approach to urban spaces relying on the potential area of influence of a city. Instead of the FUA data that appears relatively unreliable in border regions due to biases in national statistics as far as cross-border commuters are concerned (PEETERS 2011), we bring in the notion of Potential Urban Strategic Horizons (PUSH) also elaborated by ESPON. PUSH areas are defined as all the municipalities that are located no more than 45 minutes away from a Morphological Urban Area (MUA). This travel distance is considered to reflect the area of influence of an urban centre over its hinterland. One strong limitation of the PUSH notion is that the range of influence is the same whatever the size of the urban centre. In order not to overestimate the influence of small cities and rather focus the study on those urban centres that have a 'real' potential in drawing in their hinterland, a selection criterion has been applied and only MUAs with at least 100,000 inhabitants in 2006 have been taken into account. The potential influence of smaller cities is thus not included in the analysis

Among the 212 PUSH that are linked to a MUA of at least 100,000 inhabitants, a distinction is made between *metropolitan areas* and *non-metropolitan areas*. The hypothesis underlying this analytical distinction states that the potential offered by a city with metropolitan functions is likely to be higher than the potential of a city that is not considered as a metropol-

itan centre. The categorisation of the PUSH selected follows a two-step methodology. A first set of cities has been selected according to a composite index elaborated in ESPON 1.4.3 and called 'global score' (ESPON 2007). This index, computed for 1,221 FUAs in Europe, is based on 5 domains (i.e. administration, decision, transport, knowledge and tourism) plus the population (at FUA level). The threshold between the two types of PUSH (i.e. metropolitan vs. non-metropolitan) has been empirically fixed at 4. In a second step, the selection of the metropolitan areas has been refined according to comparisons with other metropolitan/city indexes (BBSR 2010; ROZENBLAT & CICILLE 2003). This two-step procedure was necessary in view of statistical inconsistencies for some cities and the contradictory results this generates.

Classification procedure

The classification of the municipalities located within the European border regions is conducted following a descending hierarchical method. The implementation of this supervised classification is done according to the following decision tree (see Fig. 1).

Starting with 57,152 municipalities (LAU-2 units) located in the border regions under scrutiny (both 45 and 90 minutes travel distance to a border), the first splitting path is based on whether they are located within PUSH areas with more than 100,000 inhabitants or not. The former refers to border regions with high urban potential whereas the latter relates to border regions with low urban potential. The second splitting path is applied according to the metropolitan functions of the PUSH areas considered, namely metropolitan and non-metropolitan areas. In case of an overlap between the two categories, the decision favours the former at the expense of the latter as the influence of an urban centre with metropolitan functions prevails. The third splitting path relies on the location of the urban areas within the core border region or the adjacent border region. A fourth splitting path is applied according

² For most European countries included in this study, LAU-2 units were taken into consideration. These units usually correspond to municipalities, except for Bulgaria and Hungary (Settlements), Ireland (Districts), Lithuania (Elderships), Malta (Councils), Portugal (Parishes), and the UK (Wards). LAU-1 units were used for Denmark (Municipalities), Greece (Municipalities) and Turkey (Districts).

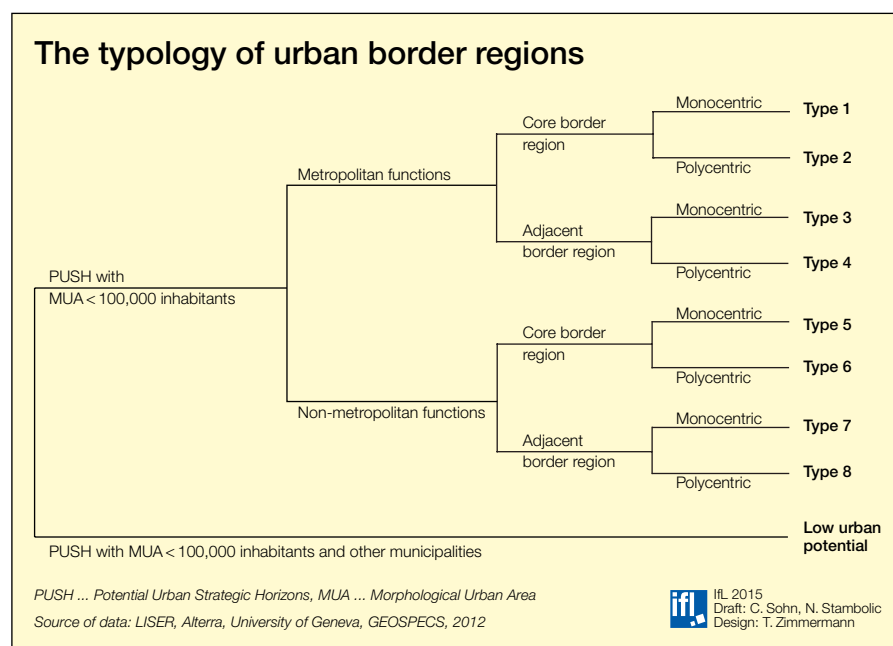


Fig. 1: The typology of urban border regions

to the monocentric (one urban centre) or polycentric (multiple urban centres) pattern of the urban areas considered. A monocentric configuration means that a given border region is influenced by one urban centre only whereas a polycentric

configuration means that there are at least two. In case of an overlap between urban areas belonging to the two types of border regions, the influence of the core border region with a polycentric setting prevails.

To sum up, it is important to mention that this typology highlights the urban potential of border regions according to 1) the metropolitan function of the urban centres and 2) their location vis-à-vis land borders (within the core border region or within the adjacent border region). As such, the influence of borders is considered through the location of the urban activities that are polarizing space. The basic assumption is that a city located close to a border (in terms of time distance) is more likely to develop border-dependent activities than a city located further away and that this specificity will also affect the development potential of its hinterland. Although the potential cross-border dimension of the urban and metropolitan areas is not considered as part of the typology (the 'elementary unit of analysis' being the border region), specific configurations such as cross-border metropolitan regions can be identified from the cartographic interpretation of results: they are characterised by the presence of entities crossing the border or being adjacent on either side of the border.

A European perspective on urbanisation in border regions

In order to assess the importance of the phenomenon of urbanisation in border regions in Europe, the analysis that follows mobilises demographic data and applies it to the spatial typology elaborated. To simplify the analysis, the eight categories presented in the typology (Fig. 1) have been aggregated into three: metropolitan potential (types 1 to 4), non-metropolitan urban potential (types 4 to 8) and low urban potential. First, we consider the resident population in 2006 and examine the distribution of borderland populations by country in order to highlight national specificities. Second, we perform a diachronic analysis of the population change between 2001 and 2006 to reveal the urbanisation dynamics of border regions³.

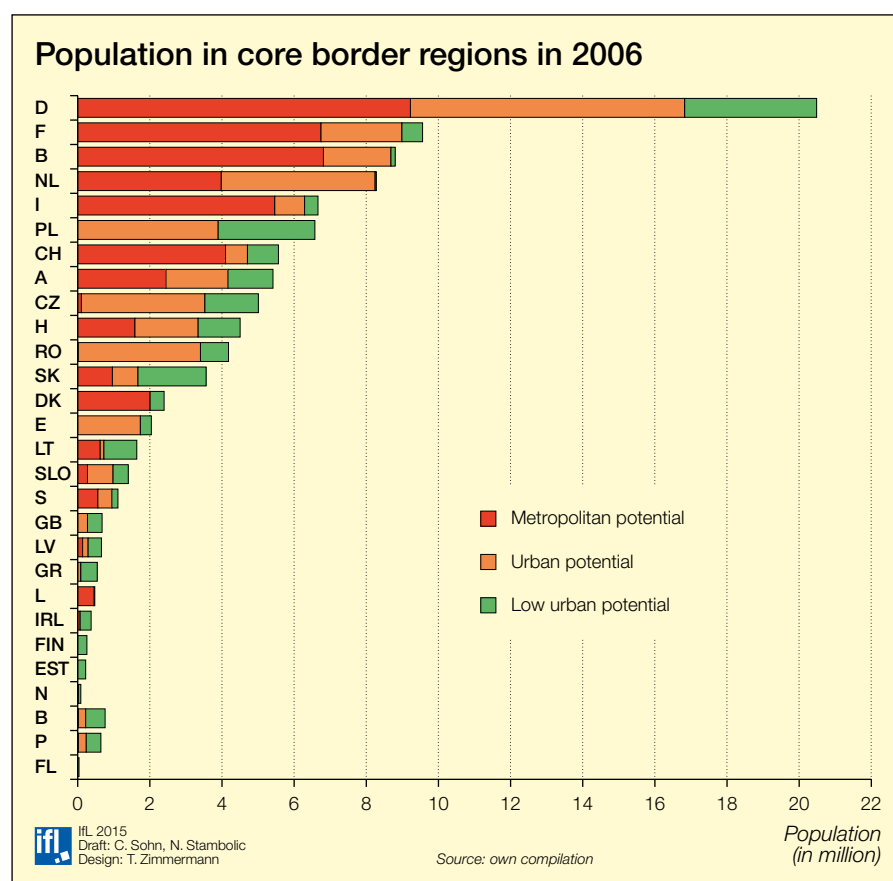


Fig. 2: Population in core border regions in 2006

³ The period of analysis (2001-2006) corresponds to the most recent data available at the time the research was conducted.

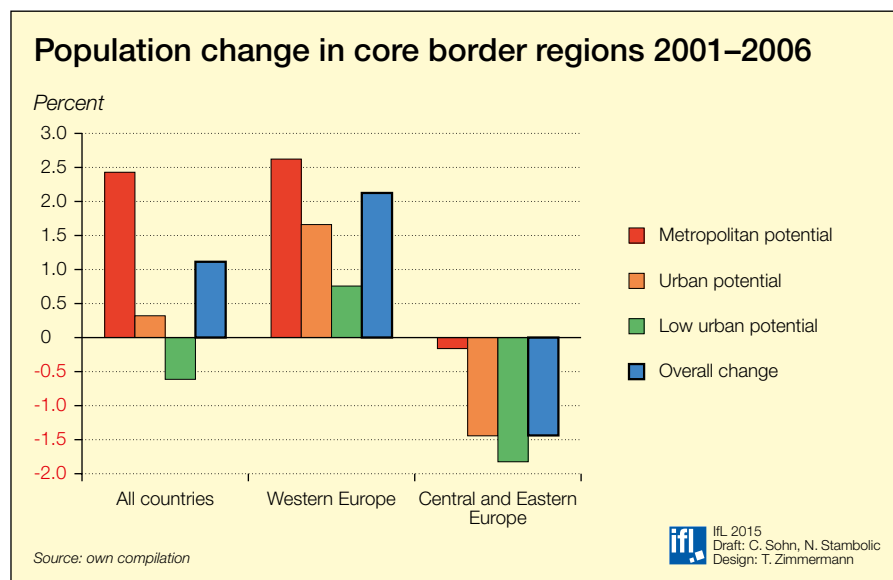


Fig. 3: Population change in core border regions 2001-2006 (%)

Population distribution in 2006

European core border regions, composed of all the municipalities located less than 45 minutes away from a border, were host to 102 million inhabitants in 2006. 45 % (45.7 million) were living in a border region with metropolitan potential and 35 % (36.2 million) in a border region with non-metropolitan urban potential. In total, almost 80 % of the population living in border regions in 2006 could thus be considered as urban. The inclusion of the adjacent border regions, composed of all the municipalities located less than 90 minutes away from a border, results logically in an increase of the population considered (209 million) but with no significant change as regards the distribution among the three main categories of border regions.

The analysis of the population distribution by country brings sharp contrasts to the fore (Fig. 2). In absolute terms, Germany, followed by Belgium, France, Italy, Switzerland and the Netherlands are the countries that host the highest number of people living in border regions with metropolitan potential (almost 80 %). On the other side, the Baltic countries and Eastern European countries like Poland, Czech Republic, Bulgaria or Romania show a very low population level for this category of border region. When considering the population distribution for non-

metropolitan urban border regions there is less contrast and Eastern European countries like Poland, the Czech Republic and Romania show rather high values. The country that hosts the highest number of inhabitants in border regions with low urban potential is Germany (3.6 million).

Population change 2001-2006

Population change is a highly valuable indicator as it reflects the socio-economic dynamics of the border regions and, to some extent, their attractiveness. More specifically, a positive growth rate tends to demonstrate the existence of a metropolitanisation/urbanisation process whereas a negative rate reflects a process of urban decline or rural emigration. The analysis of population change is based on population statistics collected at LAU-2 level for 2001 and 2006. This limited observation period is used to reveal the main trends of the urbanisation dynamics and the results should therefore be interpreted with caution. Furthermore, the lack of reliable data in 2001 for Lithuania, Portugal and the United Kingdom has resulted in the exclusion of these countries from the calculation of population growth.

As shown in Figure 3, there is a clear trend towards an increase in population within border regions that have a metropolitan profile. At the European level, this

represents more than one million inhabitants in 5 years (+2.4 %). In contrast, urban border regions that are not metropolitan appear as rather stable (+0.3 %) and rural border regions experienced a demographic decline (-0.6 %). In total, European core border regions witnessed an increase of population of about 1.1 % between 2001 and 2006.

When considering the data at country level, one can witness a clear distinction between two groups of countries as far as demographic trends are concerned. On the one hand, we can group together Eastern European countries, most of whom joined the EU recently and which, on average, show a demographic decline in their border regions (-1.4 %). One can note that this is basically also the case at national level, except for Slovenia which experienced a positive growth. On the other hand, there are the older member states (plus Norway and Switzerland) who experienced a positive demographic growth both on average (+2.1 %) and on an individual basis (except Finland and Greece). The contrast between the two groups of countries is confirmed once the different categories of border regions are taken into consideration. In Western Europe, border regions with metropolitan or urban potential saw a clear increase in population (respectively +2.6 and +1.7 %) whereas within Eastern European countries the border regions with metropolitan potential were almost stable (-0.2 %) and the two other categories declined (-1.4 % for urban potential and -1.8 % for low urban potential).

Regional patterns of urban border regions

The geographic analysis and mapping of the European urban border regions suggests different spatial patterns. In this paper we focus on four main types. Starting with core border regions with metropolitan potential, namely those that represent privileged anchoring points for globalisation, two patterns of region-based urban entities are distinguished: cross-border metropolitan regions and metropolitan border regions. A third category

Europe Urban potential of functional border regions

- Monocentric core metropolitan border region (type 1)
- Polycentric core metropolitan border region (type 2)
- Monocentric adjacent metropolitan border region (type 3)
- Polycentric adjacent metropolitan border region (type 4)
- Monocentric core urban border region (type 5)
- Polycentric core urban border region (type 6)
- Monocentric adjacent urban border region (type 7)
- Polycentric adjacent urban border region (type 8)
- Low urban potential

Source of data: LISER, Alterra, University of Geneva, GEOSPECS, 2012
© EuroGeographics Association for administrative boundaries



Fig. 4: Urban potential of functional border regions in Europe

that has been hardly investigated so far is composed of border regions with metropolitan spillover effects. The last category refers to border regions with non-metropolitan urban potential and is composed of three specific settings. For each type of urban border region, some examples will be given in order to illustrate their main characteristics. These descriptions are not, however, intended to be exhaustive.

Cross-border metropolitan regions

The first category is made of metropolitan centres located close to a border and which also present a significant cross-border dimension (type 1 and 2 - in red on Fig. 4). In terms of location, most of these cases are found in north-western Europe, notably along the borders of the Benelux countries, France, Germany and Switzerland. The most prominent cases are Lille, Luxembourg, Strasbourg, Basel and Geneva where cross-border functional as well as institutional integration is a reality (ESPON 2010). Two additional polycentric cross-border metropolitan regions complement this category: Copenhagen-Malmö between Denmark and Sweden and Vienna-Bratislava in Central Europe. All these cases have been identified in the ESPON as well as BBSR studies mentioned earlier, confirming the relevance of our approach.

Beyond the fact that these urban regions display a cross-border metropolitan potential, different configurations can be distinguished. First, there are medium-sized cities like Basel, Geneva and Luxembourg that concentrate high-profile metropolitan activities⁴ such as pharmaceuticals and life-sciences, banking and international activities, and which exert some of the most powerful attraction on cross-border workers across Europe with respectively 52,000, 61,000 and 152,000 workers in 2011 (SOHN & REITEL 2013). Despite their modest demographic size of between 100,000 and

200,000 inhabitants, these cities polarize cross-border labour market areas of almost one million residents each (SOHN et al. 2009). This strong functional cross-border integration is highly asymmetric and highlights a core-periphery setting. Based on the mobilisation of cross-border differentials in taxes, regulations and wages, the economic development of these 'small metropolises' relies on the border as a resource (SOHN 2014). As far as institutional integration is concerned, Basel and Geneva have engaged in ambitious cross-border urban agglomeration projects with their neighbouring partners, named the Tri-national Eurodistrict Basel and Greater Geneva (former Geneva Agglomeration Project) respectively, whereas Luxembourg has recently launched a strategy to develop a cross-border polycentric metropolitan region with its partners from the Greater Region (SOHN et al. 2009; SOHN 2012).

The second configuration of cross-border metropolitan regions is composed of major European metropolises like Vienna, Copenhagen and to a lesser extent Lille, that develop cross-border economic, social and cultural relations with their neighbouring border cities, although they do not form an integrated functional urban region. Despite strong economic imbalances between the metropolitan core and its border periphery the number of cross-border workers remains somewhat limited (around 20,000 people in each case). High transportation costs for the bridge between Copenhagen and Malmö, institutional restrictions regarding the free movement of workers in the Austrian labour market in the case of Vienna and Bratislava (albeit lifted in 2011) and weak economic disparities between Lille and the Belgium cities of Kortrijk and Tournai explain such modest transnational functional integration. The different cases have also engaged in notable cross-border metropolitan cooperation initiatives: the Eurometropolis Lille-Kortrijk-Tournai was the first to create a European Grouping for Territorial Cooperation (EGTC) in Europe in 2008, the Oresund Committee, encompassing Co-

penhagen and Malmö, is often presented as one of the most successful cross-border region in Europe (NAUWELAERS et al. 2013) and Vienna and Bratislava are at the heart of the Centroeuroregion (GIFFINGER & HAMEDINGER 2013).

Metropolitan border regions

The second category is composed of metropolitan centres located at a distance from the border, although still within a core border region, and which do not display any significant cross-border potential like Brussels, Budapest, Cologne, Düsseldorf, Eindhoven, Milan or Zurich. These are large and economically powerful metropolitan areas that are more oriented toward their national territories than towards neighbouring border regions. Their cross-border influence is limited to the edges of their metropolitan area and is therefore marginal. The case of Milan illustrates this as less than 1 % of the population of the FUA actually lives in the southern part of the Swiss Canton of Ticino (mainly in Chiasso, Mendrisio and Lugano) (ESPON 2007).

Despite being relatively close to a border (less than 45 minutes by car), these metropolitan areas tend not to develop territorial cooperation with their neighbouring border regions. The border context and its related effects (opportunities and hindrances) are therefore overlooked. If the proximity to the border seems to have little relevance to the metropolitan core cities that do not *a priori* conceive themselves as being border cities, this is not the case for the peri-urban areas located close to it. Indeed, the weakness or even absence of cross-border functional interactions or spillover effects does not mean that there is no significant border effect.

Border regions with metropolitan spillover effects

The third type of border regions with metropolitan potential identified in this study concerns metropolitan areas located in an adjacent border region (more than 45 minutes by car). Such cases (type 3 and 4, in orange on Fig. 4) are particu-

4 Basel, Geneva and Luxembourg rank respectively 18th, 19th and 30th in term of their metropolitan function index out of 125 European metropolitan areas identified by the BBSR (2010).

larly well represented in Germany, due to the presence of metropolitan centres like Berlin, Munich, Stuttgart and Hamburg, all located at a certain distance from national borders. Other cases in Europe are Bucharest, Dublin, Ljubljana, Oslo, Prague, Riga, Sofia and Turin. Due to their distance from the border, and also considering the fact that a number are capital cities, the aforementioned metropolitan areas have usually not developed functional interactions or institutional cooperation with their neighbouring border regions.

The specific spatial setting of border regions located at a distance from metropolitan areas and which face spillover effects is worth noting. Indeed, these territories face a 'double peripherality', being peripheral from a national territorial point of view as well as peripheral in relation to a metropolitan area. Unlike the cross-border metropolitan regions, and to a lesser extent the metropolitan border regions in this case, the spatial mismatch between the area of influence of the metropolis and of the border does not allow the exploitation of synergic effects; the fate of interstitial spaces should therefore be addressed in a specific way.

Border regions with urban potential

Border regions with urban (non-metropolitan) potential (type 5 and 6, in purple on Fig. 4) encompass three main spatial settings that are rather well distributed all over Europe. The first setting is composed of highly urbanised border regions with polycentric cross-border potential. In Western Europe, cases like Groningen and Enschede-Hengelo-Gronau on the northern section of the Dutch-German border or San Sebastian-Bayonne along the French-Spanish border (Basque country) are characterised by long standing cross-border cooperation and strong socio-economic and cultural interactions. In the borderlands of Eastern and Central Europe, the most prominent cases are Rybnik, Bielsko-Biala, Katowice and Ostrava at the Polish-Czech border, Debrecen and Oradea and the Hungarian-Romanian border and Gdansk-Kaliningrad

at the Polish-Russian border (although Russia's border regions are not included in the analysis). In these border regions, which are often faced with the restructuring of traditional industries combined with demographic decline, the process of cross-border economic integration remains limited due to the resilience of border barrier effects.

The second setting of non-metropolitan urban border regions is characterised by limited cross-border integration potentials. These involve medium-sized cities such as Chemnitz-Zwickau and Dresden in Germany, Szczecin at the Polish-German border, Linz and Graz in Austria.

The last setting is composed of urban border regions that are located close to a metropolitan area and are often implicated in the political construction of a cross-border metropolitan region. Cases such as Metz and Saarbrücken within the Greater Region, Győr within the Centrope region and Karlsruhe in the Upper Rhine are emblematic of such a configuration. In all these cases, the border cities (those that have metropolitan functions and those that do not) are engaged in mutual cross-border cooperation and at the same time, in political struggles for the cross-border regional leadership (for the case of the Greater Region, see notably SOHN 2012).

Conclusions

This paper has brought to the fore an assessment of the urban development of European border regions based on the elaboration of a spatial typology mobilising a functional approach. The typology highlights the urban potential of border regions according to the metropolitan function of the urban centres and their location vis-à-vis land borders. In Europe, border regions located less than 45 minutes from their nearest border hosted 102 million inhabitants in 2006. The vast majority of this population (80 %) lives in areas subjected to urban influence and a significant portion (45 %) lives in areas under metropolitan influence. Most of the core border regions with metropolitan potential are concentrated in the north-

western part of Europe along the borders of the Benelux countries, Germany, France and Switzerland. The analysis of population change between 2001 and 2006 has demonstrated that at European level, border regions with metropolitan as well as urban potential are experiencing positive growth rates. By disaggregating the data at country level, a sharp contrast appears between Western European countries and Eastern and Central European countries. The former show positive growth rates in all categories but with a strong emphasis on core border regions with metropolitan potential whereas the latter experience population decline, especially in areas that have no metropolitan potential.

From a geographic point of view, the spatial typology of European border regions highlights four categories of urban border regions. First, there are cross-border metropolitan regions centred on cities located close to a border and that present a strong potential for cross-border functional integration. Second, there are metropolitan centres located at a distance from the border, although still within a core border region, which do not have any significant cross-border dimension. Third, some core border regions are subject to metropolitan spillover effects derived from urban centres located within an adjacent border region (between 45 and 90 minutes from the nearest border). Last, we distinguish urban border regions with non-metropolitan potential.

These empirical trends suggest two final remarks with theoretical implications. First, it appears clearly that a border context is not incompatible with the development of competitive urban centres as suggested by classical and neo-classical location theories. The relatively strong population growth experienced in metropolitan core border regions might even illustrate some kind of social and economic attractiveness within these specific areas. Although this result relies on a limited observation period, it converges with the findings given by BRAKMAN et al. (2012) based on statistical modelling of city population growth in

Europe. Second, the strong contrast between Western European countries and Eastern and Central European countries highlights the determining role of time in the urbanisation of regions close to open borders. Whereas from the 1980s onwards old EU member states have been putting forward the interface function of their borders rather than their role as barriers and control posts, this trend is much more recent among the newer EU member states. In addition to the differentiated historical depth of the process of European integration, one should also consider the long-lasting border-related barrier effects (institutional, cultural and mental) inherited from the former communist era (for an illustration, see SOHN & GIFFINGER 2015). There is therefore a need for policy-making in the field of European Territorial Cooperation to take into consideration these historical contingencies. Different types of support as well as fine-tuning cross-border cooperation and integration policies should be envisaged, but based on a recognition of the differentiated nature of borders and the various economic and social contexts that prevail within European border regions.

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Резюме

Кристоф Зон, Нора Стамбolic

Городское развитие европейских приграничных регионов в Европе: пространственная типология

Уже в течение длительного времени приграничные регионы рассматриваются как экономически неблагополучные, непривлекательные для городского развития. Расширение и интеграционные процессы в Европейском Союзе и, как следствие, относительное открытие границ, оказали значительное влияние на приграничные регионы, благодаря чему возникли новые модели городского развития. В статье представлены эмпирические данные о влиянии урбанизации во всех европейских приграничных регионах. В рамках функционального подхода приграничные регионы классифицируются в соответствии с тем, насколько сильное влияние оказывает относительная близость к границе на ту или иную тенденцию. Основанная на этом типология включает восемь категорий урбанизированных приграничных регионов и освещает их географические закономерности на европейском уровне. Демографические данные используются для более полной оценки значимости городского развития приграничных регионов, в том числе их трансграничного положения, и для комплексного рассмотрения национальных особенностей.

Приграничные регионы, городской потенциал, урбанизированные территории, пространственная типология, Европа

Résumé

CHRISTOPHE SOHN and NORA STAMBOLIC

Le développement urbain des régions frontalières européennes: une typologie spatiale

Les régions frontalières ont pendant longtemps été considérées comme des zones économiquement défavorisées, non propices au développement urbain. Le processus d'élargissement et d'intégration de l'Union Européenne ainsi que la relative ouverture des frontières subséquente ont eu un profond impact sur les régions frontalières, dont résultent de nouveaux modèles de développement urbain. L'objectif de cette contribution est de fournir des preuves empiriques quant aux effets de l'urbanisation dans toutes les régions frontalières européennes. Reposant sur une approche fonctionnelle qui délimite les régions frontalières selon leur propension à être influencées par leur relative proximité d'une frontière, la typologie qui en est issue met en évidence huit catégories de régions frontalières urbaines et souligne leur modèle géographique à l'échelle européenne. L'usage de données démographiques permet une meilleure évaluation de l'importance du développement urbain des régions frontalières, y compris de leur dimension transfrontalière, et de souligner des spécificités nationales.

Régions frontalières, potentiel urbain, aires métropolitaines, typologie spatiale, Europe